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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|-------------------------------|------------------|
| 10/690,068 | 10/20/2003 | Kenneth Wayne Boyd | TUC920030005US1 | 6656 |
| 46917 7590 01/11/2007 KONRAD RAYNES & VICTOR, LLP. ATTN: IBM37 315 SOUTH BEVERLY DRIVE, SUITE 210 BEVERLY HILLS, CA 90212 | | | EXAMINER ASSESSOR, BRIAN J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2114 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 01/11/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/690,068 | Applicant(s) BOYD ET AL. | |
| | Examiner Brian J. Assessor | Art Unit 2114 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7-11,13-15,17-21,23-25 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7-11,13-15,17-21,23-25 and 27-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/20/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 2, 6, 12, 16, 22, and 26.

Claims 1, 5, 7, 11, 15, 17, 21, 23-25, and 27-30 are amended and area address below.

Claims 1,3-5,7-11,13-15,17-21,23-25 and 27-30, are still pending in this application and are addressed below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 11, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Bhaskaran (6,266,335).

As per claim 1:

A method for switching, the method comprising:

receiving an indication of a failure of a primary storage subsystem at a switch,
(Bhaskaran column 8, lines 46-49)

wherein the switch couples a host to the primary storage subsystem and a secondary storage subsystem; (Bhaskaran figure 1, elements 200 and 205)

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subsequently, directing a command from the host received at the switch to the secondary storage subsystem for completion. (Bhaskaran column 8, lines 49-50)

by changing a source volume and a target volume in the command to correspond to volumes in the secondary storage subsystem, wherein the source volume and the target volume are for I/O operations, and wherein the changing is performed by a switching application in the switch. (Bhaskaran column 8, lines 46-50)

Claim 11 is a system claim corresponding to the method claim 1. Therefore, claim 11 is rejected for the same rationale as claim 1.

Claim 21 is a system claim corresponding to the method claim 1. Therefore, claim 21 is rejected for the same rationale as claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 13, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhaskaran (6,266,335) in view of Allen (7,003,693).

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As per claim 3:

The method of claim 1, further comprising:

receiving a notification at the switch from a monitor application that traps an I/O alert corresponding to the failure, wherein the monitor application is coupled to a hardware unit coupled to the primary storage subsystem; (Bhaskaran column 8, lines 46-49)

Bhaskaran does not explicitly disclose a method in which holds an I/O request that resulted in the failure in a busy state at the monitor application.

In column 82, lines 19-29; Allen clearly discloses a system which holds I/O requests during a failure and during a failover from a primary system to a secondary system. It would have been obvious to a person of ordinary skill in the art at the time of invention to include the I/O holding method as taught by Allen in order to create a smoother failover transition. This would have been obvious because Allen clearly teaches that the above process is better suited for managing duplexing capabilities. (Allen column 6, lines 8-14)

Claim 13 is a system claim corresponding to the method claim 3. Therefore, claim 13 is rejected for the same rationale set forth in claim 3.

Claim 23 is an computer readable storage medium claim corresponding to the method claim 3. Therefore, claim 23 is rejected for the same rationale set forth in claim 3.

Claims 4, 14, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhaskaran (6,266,335) in view of Kandasamy (5,513,314).

Bhaskaran fails to explicitly disclose:

receiving a notification at a monitor application that the primary storage subsystem is functioning properly, wherein the monitor application is coupled to a hardware unit coupled to the primary storage subsystem; (Kandasamy column 17, lines 25-33)

synchronizing data in the secondary storage subsystem to the primary storage subsystem; (Kandasamy column 17, lines 54-56)

directing a command from the host received at the switch to the primary storage subsystem for completion. (Kandasamy column 17, lines 60-63)

In column 17, lines 25-63 Kandasamy clearly discloses a method wherein a notification is received at a monitor that the primary storage system has failed, the data is synchronized between a primary and secondary storage system, and then the commands are directed to the secondary in place of the primary storage system.

It would have been obvious to a person of ordinary skill in the art at the time of invention to include the system as taught by Kandasamy in order to create a more fault tolerant storage system failover. This would have been obvious because Kandasamy clearly teaches that the above process is better suited for a failover system without losing data from during the failover event. (Kandasamy column 4, lines 1-7)

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Claim 14 is a system claim corresponding to the method claim 4. Therefore, claim 14 is rejected for the same rationale set forth in claim 4.

Claim 24 is an computer readable storage medium claim corresponding to the method claim 4. Therefore, claim 24 is rejected for the same rationale set forth in claim 4.

Claims 5, 7-10, 15, 17-20, 25, and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kandasamy (5,513,314) in view of Bhaskaran (6,266,335).

As per claim 5:

A method for data replication, the method comprising:

if the I/O command is a write I/O, then writing data via the switch to a primary storage subsystem and a secondary storage subsystem, (Kandasamy column 5, lines 57-63)

wherein the switch couples the host to the primary storage subsystem and the secondary storage subsystem, and wherein the data written to the primary storage subsystem and the data written to the secondary storage subsystem are the same. (Kandasamy column 5, line 67 - column 6, line 3)

Kandasamy does not explicitly disclose a method wherein an I/O command is received at a switch from a host;

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In column 8, lines 46-50; Bhaskaran clearly discloses a system which uses a switch to direct I/O requests to the storage systems.

It would have been obvious to a person of ordinary skill in the art at the time of invention to include the system as taught by Bhaskaran in order to create a more efficient I/O requests processing and routing system. This would have been obvious because Bhaskaran clearly teaches that the above process is better suited for maintaining the flow of a network, even during a failover event. (Bhaskaran column 3, lines 28-42)

if the I/O command is a read I/O, then reading the data exclusively from the primary storage subsystem. (Kandasamy column 5, lines 57-63)

As per claim 7:

The method of claim 5, further comprising:

determining if a switching application in the switch is in an asynchronous mode;

(Kandasamy column 11, lines 37-42)

if the switching application is in an asynchronous mode, then:

(i) writing the data to the primary storage subsystem; (Kandasamy column 11, lines 46-49)

(ii) writing the data to a buffer in the switch; (inherent; in order to transfer data to both the primary and secondary systems the data must be buffered.)

(iii) copying, by the switching application in the switch, the data from the switch to the secondary storage subsystem. (Kandasamy column 11, lines 46-49)

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As per claim 8:

The method of claim 5, further comprising:

determining if a switching application in the switch is in a synchronous mode;

(Kandasamy column 11, lines 37-42)

if the switching application is in a synchronous mode, then writing the data to the primary storage subsystem and the secondary storage subsystem substantially simultaneously. (Kandasamy column 11, lines 38-42)

As per claim 9:

The method of claim 5, wherein the primary storage subsystem and the secondary storage subsystem comprise a plurality of logical storage units, wherein the primary storage subsystem and the secondary storage subsystem include the same data. (Kandasamy column 4, lines 55-58)

As per claim 10:

The method of claim 5, wherein in the event of a failure of the primary storage subsystem, a switching application in the switch directs a subsequent I/O command from the host to the secondary storage subsystem. (Bhaskaran column 8, lines 46-50)

Claims 15 and 17-20 respectively are system claims corresponding to the method claims 5 and 7-10. Therefore, claims 15 and 17-20 are rejected for the same rationale as claim 5 and 7-10.

Claims 25 and 27-30 respectively are computer readable storage medium claims corresponding to the method claims 5 and 7-10. Therefore, claims 25 and 27-30 are rejected for the same rationale as claim 5 and 7-10.

Response to Arguments

Applicant's arguments filed 11/22/2006 have been fully considered but they are not persuasive.

Applicant's Arguments:

Applicant argues that the claim elements in claims 2, 12, and 22 are not all taught by Bhaskaran, making claims 1, 11, and 21 allowable through amendment.

Examiner's Response:

The claims are covered in Bhaskaran in both the original rejection of (Bhaskaran column 8, lines 46-50), and throughout the specification. To be more specific, examiner directs applicant to column 6, lines 51-59. The first limitation of, "a source volume and a target volume in a command received at the switch from the host" is disclosed in (Bhaskaran column 6, lines 51-53). The second limitation of, "changing, by the

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switching application in the switch, the source volume and a target volume in the command to correspond to volumes in the secondary storage system, is disclosed by (Bhaskaran column 8, lines 56-59). These two citations clearly disclose a system wherein the switch changes the destination and source address when a failover occurs. Therefore, examiner respectfully maintains the rejection.

Applicant's Arguments:

That the rejection of claim 6, teaches away from the claimed subject matter, and that Kandasamy does not teach reading exclusively from the primary volume.

Examiner's Answer:

Claims 5, 15, and 25 have been amended to include the limitations of claim 6, and remain rejected. Examiner directs applicant to Kandasamy column 14, lines 41-47, where it is disclosed that the read request is only accepted and executed by the primary server and ignored by the secondary server. Therefore, the read command is only accessed through the primary server. Therefore, examiner respectfully maintains the rejection.

Applicant's Arguments:

Applicant argues that in claims 3, 13, and 23 the monitor application is coupled to a hardware unit couple to the primary storage system.

Examiner's Answer:

Examiner directs applicant to figures 5A-5C wherein there are various implementations of the switch hardware that runs the switching applications and the I/O means to communicate with the primary storage unit. Therefore, examiner respectfully maintains the rejection.

Applicant's Arguments:

Applicant argues that Kandasamy or Bhaskaran teach the claim requirements of 7, 17, and 27 copying the data from the switch to the secondary storage subsystem is preformed by the switching application in the switch.

Examiner's Response:

Examiner directs applicant to figure 3 and column 11, lines 37-49 where it is clearly disclosed that the data flow (controlled by the switch) issues a request to both the primary and secondary servers, and then operate in parallel to write the data to both servers. Therefore, examiner respectfully maintains the rejection.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Assessor whose telephone number is (571) 272-0825. The examiner can normally be reached on M-F 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571)272-3644. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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BA

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SCOTT BADERMAN
SUPERVISORY PATENT EXAMINER